Equipment Readiness in Iraq

A Monograph
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This monograph analyzes the efficiency of the Army's doctrine regarding the management and distribution of repair parts and the impact it had on equipment readiness during Operations Iraq Freedom. The monograph argues that in order for the United States Army to improve equipment readiness there must be doctrinal changes in repair parts operations to improve receipt processing time, requisition wait time, asset visibility and the referral process. After a through investigation the monograph shows that ineffective repair part operations negatively impacted equipment readiness during both Desert Shield and Desert Storm and Operation Iraqi Freedom.

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Abstract

Equipment Readiness in Iraq, by LTC Jimmie Mister, Jr., United States Army, 47 pages.

This monograph analyzes the efficiency of the Army's doctrine regarding the management and distribution of repair parts and the impact it had on equipment readiness during Operations Iraq Freedom. The monograph argues that in order for the United States Army to improve equipment readiness there must be doctrinal changes in repair parts operations to improve receipt processing time, requisition wait time, asset visibility and the referral process. After a through investigation the monograph shows that ineffective repair part operations negatively impacted equipment readiness during both Desert Shield and Desert Storm and Operation Iraqi Freedom. The monograph shows that the longer a repair part stayed at the Supply Support Activity (SSA) without being processed, the more likely that the repair part was lost or stolen which meant longer non-mission capable time for equipment. In accordance with a race track data chart from the United States Army's Transportation Command, the average requisition wait time for repair parts during Operation Iraqi Freedom were twenty days which exceeds the Department of the Army's average for repair part operations, which means the repair parts never reached the intended users, again longer non-mission capable time for equipment. Despite an effort to improve asset visibility after Desert Shield and Desert Storm, the monograph reveal that asset visibility was lost for a large percentage of repair parts during Operation Iraq Freedom in which became frustrated cargo and never got to the intended users, which also negatively impacted equipment readiness during Operation Iraqi Freedom. After investigating the referral process, the results reveal that a large percentage of the repair parts required to improve equipment readiness was on-hand in theater; however the parts were often not visible because the referral process was ineffective.

This monograph suggests that the United States Army can improve the distribution and management of repair parts during future combat operations by implementing the following modification to repair part operations doctrine. First, field very small aperture terminals (VSATs) from the tactical to strategic level to improve logistic communications. This tremendous capability will provide the warfighter and logistician the capability to access real time data on the status of requisitions throughout the logistics system, which will prevent units from reordering the same parts multiple times because of uncertainty in the statutes. Secondly, eliminate two steps in the requisition process in SARSS-O. Eliminating the SARSS 2AD and SARSS 2AC systems in the process and allowing SARSS-1 to communicate directly with the SARSS-Gateway at the strategic level, will allow logisticians to establish a requisition at the wholesale level much faster and reduce the requisition wait time tremendously. Thirdly, recommend that the United States Army establish procedures and doctrine for requisition identification code pure processing. This will allow the Army's Depot's to receive, process, and package repair parts by brigade pallets. These procedures will improve requisition wait time, asset visibility, and receipt processing time. Finally, this monograph recommends that the United States Army implement doctrine and procedures that will allow the shipment of repair parts SSA-Pure. SSA pure is defined as shipping repair parts from the Depot to the theater of operations by SSA rather than individual units which will also improve all aspects of repair operations.

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CHAPTER ONE

Background

1.   The Army's logisticians have learned critical lessons concerning the responsiveness, reliability, and efficiency of the Army's management and distribution of repair parts during Operation Iraqi Freedom (OIF). These lessons have impacted the Army's ability to maintain equipment readiness in Iraq today. When combat equipment becomes non-mission capable, the speed with which mechanics can repair it to mission ready depends on the availability of repair parts. This monograph will show how the distribution and management of repair parts has negatively impacted equipment readiness from the start of Operation Iraqi Freedom and continues. A clear example of the ineffective distribution and management of repair parts during the early stages of Operation Iraqi Freedom occurred between October 2002 and September 2004.[1] Track shoes for the Abrams tanks and Bradley Fighting Vehicles were not available to the Warfighters. Track shoes were scarce because the demand exceeded the amount of inventory available to meet the need of the Warfighters. Units reported critical shortages of track shoes for Abrams tanks and Bradley Fighting Vehicles for months, which negatively affected mission capabilities. According to the Government Accountability Office (GAO) many mission essential Abrams tanks and Bradley Fighting Vehicles could not operate during the summer months in 2003.[2] Maintenance records and reports of the 4th Infantry Division for the aforementioned time period convey that sufficient quantities of track shoes were not available to meet their operational needs. At one point during combat operations, the division had an operational requirement for 23,626 Abrams track shoes, of which 8,002 were shipped, but only 1,028 were eventually received.[3] To support the Bradley Fighting Vehicles, the division had an operational requirement of 29,911 track shoes, of which 4,591 were shipped, but only 744 were received. As a result of the division's inability to obtain more track shoes, the 4th Infantry Division reported

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[1]U.S. Government Accountability Office, "Actions Needed to Improve the Availability of Critical Items During Current and Future Operations," *Defense Logistics*, April 2005, 19.
[2]Ibid., 69.
[3]Ibid.

readiness rates for both types of combat vehicles continuously deteriorated.[4] Readiness for the 3rd Infantry Division was also negatively impacted by the lack of requisitioned track shoes failing to arrive as scheduled. On June 11, 2003, the division reported that of the 185 Abrams tanks on hand, 111 (or 60 percent) were deemed non-mission capable due to the lack of supplies. At one particular point in 2003, the division had 237 Bradley Fighting Vehicles on hand and 159 (or 67 percent) were deemed non- mission capable, also due to supply issues.[5] The track shoe challenges that these two divisions faced provides enough evidence to prove that procedural or doctrinal changes are necessary for the distribution and management of repair parts in the United States Army. This monograph shows that doctrinal changes must be made in the distribution and management of repair parts to improve equipment readiness.

The first major doctrinal change that must be made to improve the distribution and

management of repair parts is to re-evaluate the basic principals of how the United States

Army distributes repair parts during combat operations. The United States Army

transitioned from a supply-based Combat Service Support distribution system to a

distribution-based CSS system to improve distribution performance. Supply based CSS

is a system that relies on large, decentralized stockpiles of supplies owned by

organizations or individual units. Distribution-based CSS is a system in which smaller,

more centralized stockpiles can be used to supply numerous, geographically dispersed

organizations by leveraging modern transportation means combined with automated

information systems.[6] The concept of distribution based CSS is great, but only if the

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[4]Ibid.
[5]Ibid.
[6]U.S. Army Field Manual 100-10-1, *Theater Distribution*, 1999, 3-4.

automated information systems are operational and effectively managed. This leads to

the second major doctrinal change that must be made to improve the distribution and

management of repair parts during combat operations, which is Total Asset Visibility

(TAV). Total Asset Visibility is defined as the ability to identify the location of

equipment, supplies, or personnel during in-processing and while in transit or in storage.[7]

2.   As a result of the challenges the United States Army experienced during Desert
Shield and Desert Storm with Total Asset Visibility of in-transit supplies, the Department
of Defense developed an initiative to fix these issues. In January 1997, the Deputy Under
Secretary of Defense for Logistics and Materiel Readiness (DUSD (L& MR)) established
a task force to develop a Concept of Operations (CONOPS) for logistics processes that
required tracking of materiel through the logistics chain. This concept is called
Automatic Identification Technology (AIT).[8] AIT is the basic building block in the
Defense Department's efforts to provide timely asset visibility in the logistics pipeline,
whether in-process, in-storage, or in-transit. AIT media includes barcodes, optical
memory cards, and satellite tracking systems.[9] By enabling data collection and
transmission to automated information systems (AISs), AIT provides the warfighting
commanders with the capability to track, document, and control the deployment of
personnel and materiel.[10] However, this study shows that, even with the AIT, the
Department of Defense was unable to maintain total asset visibility of repair parts during
the early stages of Operation Iraqi Freedom, which ultimately impacted equipment
readiness.

3.   The Department of Defense (DOD) did not have adequate visibility over all
equipment and supplies transported to, within, or from the theater of operations in

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[7]U.S. Army Field Manual 101-5-1, *Operational Terms and Graphics*, (Washington DC, GPO, September 1997), 1-156
[8]U.S. Department of Defense Under Secretary of Defense (Logistics), *Logistics Automatic Identification Technology Concept of Operations*, November 1997, iii.
[9]Ibid.
[10]Ibid., 1-1.

support of Operation Iraqi Freedom. For example, although the U.S. Central Command issued a policy requiring, whenever feasible, the use of radio frequency identification tags to track assets shipped to and within the theater, these tags were not used in a uniform and consistent manner.[11] In addition, units operating in the theater did not have adequate access to, or could not fully use the DOD's logistics and asset visibility systems in order to track repair parts because these systems were not fully interoperable nor capable of exchanging information or transmitting data over the required distances. Furthermore, DOD and military service personnel lacked required training on the use of radio frequency identification tags and other tracking tools, which also adversely affected asset visibility.[12] Without effective distribution of repair parts, it is impossible to maintain accountability, visibility, and responsibility of in-transit equipment and supplies to maintain equipment readiness in Iraq.

4.   Clearly, there are challenges in the distribution and management of repair parts in Iraq which directly impact equipment readiness. Perhaps one of the biggest questions regarding the issue of the equipment status in Iraq is this: Is it possible for the United States Army to improve equipment readiness without modification to the distribution and management of repair parts? This study will show that, in order for the United States Army to improve equipment readiness in Iraq, there must be modifications to the distribution and management of repair parts.

The ability of the United States Army to sustain equipment readiness in combat is directly linked to the management and distribution of repair parts on the battlefield. This process requires effective management procedures and a highly motivated and trained logistics team. To determine if the United States Army can improve equipment readiness in Iraq with modification to its management and distribution of repair parts, first, the repair part challenges that the United States Army experienced during Desert Shield and

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[11]U.S. Government Accountability Office, 69.
[12]Ibid.

Desert Storm and the impact it had on readiness must be identified. Desert Shield and

Desert Storm were selected because they are the most recent large scale military combat

operations for the United States Army prior to Operation Iraqi Freedom. Secondly, the

current operational temp, environment, and equipment density, to which the United States

Army's equipment is exposed in support of Operation Iraqi Freedom must be laid out and

discussed, to provide insights as to the why the maintenance and repair part distribution

and management processes are critical to maintaining equipment readiness. This study

will also provide the current maintenance and repair part requisitioning procedurals, a

snapshot of supply management and asset visibility during the war. Thirdly, the doctrinal

modifications and impact that the United States Army made after Desert Shield and

Desert Storm, to improve the distribution and management of repair parts, will be

discussed. After Desert Shield and Desert Storm, the United States Army went from a

supply-based Combat Service Supply distribution system to a distribution-based CSS

system to improve distribution performance. The United States Army also made

tremendous improvements in Total Asset Visibility, and to the automated information

systems (SARSS), which provided the logisticians the capability to intensively manage

receipt processing, requisition wait time, the referral process and asset visibility as

indicators of effective supply management and distribution, which will be the criteria for this monograph.

Receipt Processing Time is the time from the date of receipt of the materiel at its destination until the date that the materiel is recorded on the requisitioner's inventory.[13] The longer a repair part stays at the Supply Support Activity (SSA) without being processed, the more likely that the repair part and/or the paperwork will become lost or stolen. What this criterion will reveal is the window of time in which receipts must be processed before the repair part is lost or stolen and has to be reordered, which negatively impacts readiness.

Requisition Wait Time (RWT) is the elapsed time between the initiation of stock replenishment action for a specific activity and the receipt by that activity of the materiel resulting from such action.[14] RWT is applicable only to material within the supply system. When equipment becomes non-mission capable, the goal of the maintainer is to repair the equipment as soon as possible, which in most cases requires a repair part. When RWT for a particular item exceeds the Department of the Army's average, it is

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[13]U.S. Army Regulation 710-2, *Supply Policy Below the National Level,* (HQ Department of the Army, Washington, DC: 8 July 2005), 34.
[14]David R. Gibson, "Average Customer Wait Time: A Supply Chain Performance Indicator," *Army Logistician,* November–December 2004.

likely that the part must be fabricated or acquired from other sources. What this criterion reveals is that when RWT for a specific item exceeds the theater's average, a large percentage of those parts never reach the user.

Asset Visibility is the ability to identify the location of equipment, supplies, or personnel during in-processing, and while in transit or in storage.[15] This criterion will reveal that when visibility is lost, a large percentage of the repair parts become frustrated cargo and never get to the intended users, which negatively impacts readiness.

Referral Process is the order used between supply sources and distribution systems to pass requisitions for supply when the initial activity cannot fill the demand.[16] When the United States Army developed the Standard Army Retail Supply System Objective (SARSS-O), it was designed to allow the Army to refer throughout a theater of operations. Referral simply means that if one division or corps does not have a repair part then it will simply refer to the other sister divisions or corps before going out of theater to the depots. This criterion also reveals that a large percentage of the repair parts required to improve equipment readiness was on-hand in theater; however, the parts were often not visible because the referral process was ineffective.

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[15]U.S. Army FM 101-5-1, Operational Terms and Graphics, 162.

Finally, after a review of the impact that distribution and management of repair parts had on equipment readiness during Desert Shield/Storm, and a detail analysis of the same during Operation Iraqi Freedom, this study validates that there must be modifications to the United States Army's distribution and management of repair parts to improve equipment readiness.

This monograph is organized into five chapters. Chapter One discussed the background and significance of the topic, followed by an outline of the hypothesis and research question. Chapter Two will identify the repair part challenges that the United States Army experienced During Desert Shield and Desert Storm and the impact it had on readiness. Chapter Three will lay out the current operational tempo, environment, and equipment density, in which the United States Army's equipment is exposed in Iraq today, and provide insight into why maintenance and repair part distribution is critical in maintaining equipment readiness. It will also discuss issues concerning repair part requisitioning, supply management and asset visibility as they have progressed throughout the war. Chapter Four will lay out the logistics doctrine modifications that were made after Desert Shield and Desert Storm and the impacts they had during

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[16]U.S. Army Regulation 725-50, *Requisition, Receipt, Issue System* (Washington D.C.: GPO, November 1995), 569.

Operation Iraqi Freedom. Chapter Five will provide proposed recommendations to improve the management and distribution of repair parts during combat operations which will ultimately improve all aspects of equipment readiness.

CHAPTER TWO

Management and Distribution of Repair Parts during Desert Shield/Storm

5.   This chapter discusses the repair parts challenges that the United States Army faced during Desert Shield and Desert Storm, in order to determine how changes in the management and distribution of repair parts has impacted equipment readiness during large scale operations before Operation Iraqi Freedom. This chapter will also help validate whether modifications should be made to the US Army's current doctrine, based on the challenges that existed then and now. These lessons were taken from After Action Reports (AARs) of the Theater Support Command (TSC) that were deployed during Desert Shield and Desert Storm. The lessons will provide insight into the modifications that are needed to the United States Army's current doctrine for the management and distribution on repair parts during large scale combat operations.

6.   The 22nd Theater Support Command was deployed in support of Desert Shield and Desert Storm to provide logistics in support of the war efforts. During the early stages of the operation, the 22nd Support Command reported that repair part shortages were perceived to be a major problem by both VII and XVIII Airborne Corps customers.[17] The two Corps were reporting that repair parts flow was becoming a war stopper. Substantial weapons systems remained deadlined due to the lack of repair parts.[18] The After Action Reports also stated that both the VII and XVIII Airborne Corps expressed their repair part concerns in their daily logistical situation report (SITREPS). The data and the concerns expressed in the SITREPS indicated that there was a shortage of repair parts in theater; however, it was more likely that materiel distribution and asset visibility were the real causes of the perceived shortage.[19]

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[17]U.S. Army 22nd Support Command, *After Action Report*, Volume V of XVI Volumes, April 1992, 21.
[18]Ibid.
[19]Ibid., 22.

Materiel Distribution during Desert Shield/Storm

7.   The materiel distribution system in support of Operations Desert Shield and Desert Storm, in general, performed satisfactorily. The systematic distribution of materiel involved a close connection between supply and transportation. The distribution system also relied heavily on the innovation of all services' logisticians.[20] The After Action Report (AAR) identified some problems which, while manageable during these operations, could have been much more serious under other circumstances. The problems that were identified were the lack of asset visibility and the prioritizations system.

Total Asset Visibility

8.   Total Asset Visibility (TAV) means knowing the status of requested materiel at every stage of the process, from factory to foxhole. TAV includes informing the requesting authority when the requisition has been received, the disposition of the request, and shipment status.[21]

9.   During Operations Desert Shield and Desert Storm, asset visibility in the United States wholesale system generally was adequate. However, visibility of assets while in transit and in-theater was poor, which resulted in considerable confusion and reordering of the same items by the same units.[22][23]

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[20]Final Report to Congress, Conduct of the Persian Gulf War, Volume 2 C1, April 1992, F-48.
[21]Ibid.
[22]Ibid.
[23]Kelvin D. Kingsley, "Asset Visibility in the Tactical Environment," *Army Logistician,* January-February 2006.
Kelvin Kingsley wrote in an article for the Army Logistician, about challenges that Department of Defense faced during Desert Shield and Desert Storm and also how we got the system we have today. He stated that the Department of Defense (DOD) has made great strides in improving asset visibility at the strategic and operational levels. The Army learned from Operations Desert Shield and Desert Storm that it was unable to track supplies and equipment from the strategic industrial base to the theater of operations. This failure caused the theater logistics footprint to grow exponentially and placed a heavy burden on supply and transportation systems. DOD recognized this deficiency and implemented steps to develop a DOD-wide

10.   The After Action Report (AAR) stated that problems existed throughout the distribution system. In the United States vendor shipments and containers often arrived directly to the port of embarkation inadequately marked or documented. Shipments arrived at ports of debarkation with the destination classified or marked as Operation Desert Shield. Even if adequately documented, frequently pallets that contained material for several units were broken down on arrival in theater and reconsolidated into shipments by destination unit.[24] This almost always destroyed any visibility that may have existed, pertaining to the pallet's contents. As a result, in-transit visibility was virtually nonexistent for many repair parts once they arrived in South West Asia (SWA).[25] The After Action Report stated that there were several reasons for this problem.

11.   First, the materiel distribution system involved thousands of people around the globe in many different organizations, inventory control points, depots, vendors, and transportation agencies. This diverse system fed through air and sea ports of debarkation to the enormously complex and rapidly changing theater distribution system.[26][27] The distribution system was confronted with units spread across exceptional distances, constantly changing unit locations, often with marginal communications and early saturation of the ground transportation system.

12.   Secondly, there was a lack of discipline in the use of the military's standard supply and transportation system. This resulted in a lack of status information, either through supply activity error or a lack of necessary communications and automation capability.[28] The AAR stated that during Operation Desert Shield, there were inadequate communications and automation capabilities in theater to receive and process status and transportation manifest information.

13.   Another reason contributing to the asset visibility problem was that manifest data received at water terminals was not shared quickly with materiel management centers

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automatic identification technology (AIT) vision to integrate existing and new technologies to support future operations.
[24]Final Report to Congress, F-48.
[25]Ibid.
[26]Ibid., F-49.
[27]U.S. General Accounting Office, Operations Desert Storm, Lack of Accountability Over Materiel During Deployment, December 1991.
[28]Final Report to Congress, F-49.

because of the backlog that accumulated. Thus, there was a lack of visibility of materiel scheduled to arrive in theater.[29][30]

14.   Clearly poor asset visibility negatively impacted readiness during Desert Shield and Desert Storm and was experienced by everyone involved. Commanders and logistics planners at every level recognized the direct relationship between maintenance readiness and combat readiness.[31] The Army Materiel Command's (AMC) Logistics Assistance Officers (LAO) went to Dhahran, Saudi Arabia to streamline requisitioning procedures between the 22nd Support Command and the wholesale system. Surges in maintenance repairs and submission of additional request for repair parts (including engines, transmissions, generators, and power packs) preceded

15. both the XVIII Airborne Corps' and VII Corps deployments.[32] Despite the most earnest efforts to keep them from materializing, shortages and problems in distributing and managing repair parts arose. A number of other factors also complicated efforts to effectively maintain visibility of, and quickly distribute, repair parts. Among them:

16. Worldwide shortages existed for some items;

17. Major units were deployed substantially ahead of their support units and sustainment stocks;

18. Late-arriving sustainment stocks were misrouted, lost, delayed, or, in some cases, not delivered;

19. Increasing the training tempo increased equipment break-down and consumption of available assets; and

20. Initially, centralized visibility and distribution management did not exist.[33]

21. But among the causes listed, none presented a greater or potentially more costly challenge than overcoming the lack of visibility and establishing centralized management.

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[29]Ibid.
[30]U.S. Department of Defense, Office of the Inspector General, "Government Performance and Results Act Performance Measure of DOD Total Asset Visibility," *Report No. D-2002-016*, November 1992.
[31]U.S. Army 22nd Support Command, 36.
[32]Ibid.
[33]Ibid., 37.

22.   Materiel managers overcame a number of obstacles during Desert Shield and Desert Storm; nevertheless, the mistakes made, along with the positive efforts exerted and the lessons learned revealed dangerous deficiencies in doctrine and procedures.[34] A number of corrective actions were undertaken and among the most critical was the establishment and resourcing of automation and the procedures which provided materiel managers with Total Asset Visibility. This capability must include accurate visibility of sustainment stocks arriving at aerial and sea ports of debarkation. Asset Visibility did not exist during Desert Shield and Desert Storm and the Army suffered needless delays and frustration.[35] Furthermore, the AAR stated that an over-reliance on manual procedures limited logistics synchronization of efforts and caused a distorted view of the commander's combat sustainment capability.

23.   Clearly, asset visibility was a challenge for the United States Army during Desert Shield and Desert Storm for the numerous reasons mentioned above; hence one would think that none of these challenges should exist during Operation Iraqi Freedom.

Priority System

24.   Another major challenge that was mentioned in the After Action Report was the Army's supply priority system. Abuse of the supply prioritization system (the system designed to give priority to crucial supplies, spares and equipment) was a problem. The Uniform Materiel Movement and Issue Priority System provided guidance on the shipping priority of parts as that priority applied to customer requests. The system was excellent in treating individual items but not quite as good in discriminating among large amounts of materiel.[36] Furthermore, the priority system requires review because it did not adequately recognize the need to return critical unserviceable items to the depot or intermediate repair facilities for repair. Ad hoc procedures were established to ensure high priority items were moved first. The return of reparable spares became important because support procedures depend on the repair and return of recoverable assets.[37] Retrograde of these items moved well from the Area of Responsibility to consolidation

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[34]Ibid.
[35]Ibid., 38.
[36]Final Report to Congress, F-49.
[37]Ibid.

ports. However, bottlenecks occurred at Rhein Main Air Base, Germany; Dover AFB, DE; and Charleston AFB, SC as pallets had to be broken down to move property to end destinations. The Pacer Return program was developed to alert transportation personnel of priority retrograde items. Pallets with cargo containing this project code were broken down ahead of other pallets.[38] The end effect of the prioritization system used in Operation Desert Shield and Desert Storm was the abuse of high priority request, inability to discriminate among these requests, and subsequent movements of misprioritized items.[39] The AAR mentioned that the Army's automation systems were designed to assist in prioritizing critical supplies; however, corrective actions needed to be taken in the software to ensure compliance.

The bottom-line is this: the current distribution system was designed to work under normal conditions using an established garrison infrastructure. The need to respond quickly to crises requires a distribution system responsive to requirements and which fits well into regional crises' infrastructure; it must provide visibility of high demand, crucial supply items, and allow for the expeditious movement to satisfy these needs. [40] Clearly, there were major repair part challenges identified during Operations Desert Shield and Desert Storm, which should have been corrected with modifications to our doctrine prior to the start of Operation Iraqi Freedom.

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[38]Ibid., F-50.
[39]Ibid.
[40]Ibid.

CHAPTER THREE

Equipment Readiness during Operation Iraqi Freedom

Operations in Iraq are placing demands on ground force equipment far beyond what is typically experienced during training or home station operations. Some of these demands arise from higher operational tempo, the harsh environment, and equipment density.[41] Therefore, it is critical to address each of the above and discuss how the United States Army's maintenance and supply systems are maintaining pace or falling behind with regard to readiness for equipment employed in the theater.

Operational Tempo

Equipment is used at a much higher rate in combat operations than it is in routine peacetime activities. In Operation Iraqi Freedom (OIF), for example, usage rates for Army systems have averaged two to eight times the comparable peacetime rates. As a case in point, Abrams tanks are being driven approximately 325 miles a month in Iraq, almost five times their peacetime average of around 70 miles.[42] While the high relative

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[41]Office of the Secretary of Defense, "Ground Force Equipment, Repair, Replacement, and Recapitalization Requirements resulting from Sustain Combat Operations," Report to Congress, April 2005, 6.

[42]Ibid., 7.

operational tempos reflect the pace of operations in OIF, they are not necessarily an indicator that equipment is being pushed beyond what it can accomplish. For example, trucks are operating about 500 miles a month in Iraq, a large relative increase from their peacetime utilization, but not an excessive mileage for a comparable civilian truck. Training needs, not projections of system lifetimes, determine peacetime operating tempos for military equipment.[43][44] Thus, it is possible that, even at the higher utilization rates experienced in OIF, equipment may be fully repairable through normal maintenance procedures.

Harsh Environment

In addition to being operated at higher rates, equipment is used under extreme conditions in combat operations. First, the very nature of warfare places stress on equipment. Whether evading enemy fire, surviving improvised explosive devices (IEDs),

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[43]Ibid.
[44]Jermaine Boyd, "High Operating Tempo and Low Manning Levels Make Preventive Maintenance Checks and Services an Ongoing Challenge During Deployment," *Army Logistician,* 2005.
Jermaine Boyd has another perspective on the Operational Tempo in which he stated that routine preventive maintenance checks and services (PMCS) are no match for the environmental extremes of Iraq and Kuwait. During sandstorms, sand is sucked into engines, where it wreaks havoc on moving parts, adding years of wear and tear in mere months. Intense heat and airborne dust cause vehicle starters and generators to fail and air, fuel, and oil filters to clog. Weekly command maintenance is needed to ensure the readiness of all equipment, including ground vehicles, weapons, communications equipment, night-vision devices, and nuclear, biological, and chemical equipment.

or engaging enemy forces in direct combat, soldiers' equipment takes a beating. The

damage resulting from combat operations, coupled with the reduced time available for

detailed maintenance, leads to an accumulation of wear and tear on equipment. The

harsh desert environment in Iraq, including both the terrain and climate, also causes

equipment damage, further increasing maintenance and spare parts requirements.[45] Parts

such as turbine engines for aircraft and tanks tend to fail more often when operating

under harsh conditions. Moreover, the wear on these subsystems steadily diminishes

their ability to be rebuilt or reused, ultimately increasing maintenance.[46] Another

contributor to equipment stress is the practice of adding armor to unarmored trucks.

Because of the extra weight and the need, in some cases to shift loads in ways for which

the vehicles were not designed, greater stress is placed on the tires, suspensions, frames,

and power trains of these systems.

Equipment Densities

The scope of maintenance and supply efforts depends not only on operational

tempos and operating environments, but also upon the volume of equipment employed in

operations. For the United States Army, equipment densities in Iraq vary by type of

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[45]Office of the Secretary of Defense, 4.

system, ranging from 9 percent of the total fleet for medium tactical wheeled vehicles to 33 percent for Stryker combat vehicles. Overall, the Army has about 22 percent of its total fleet assets engaged in Iraq. The cumulative amount of Army equipment that has been used in the operation is on the order of 40 percent of the Army's total equipment fleet.[47][48]

Maintenance in Theater

American combat forces depend on their equipment, so this equipment must be maintained at a high level of readiness in order for combat operations to be successful. Maintenance systems are therefore deployed to theaters along with combat forces to ensure that combatant commanders and the forces have reliable, safe, and ready equipment.

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[46]Ibid.
[47]Ibid.
[48]Colonel Donald R. Nitti, "A Blackhawk Pilot View on the Harsh Environment of Operations Iraq Freedom, *Purple Pride*, 2005.
Major Donald R. Nitti, Maintenance Test Polit provided his perspective on the harsh environment in Iraq with aircraft maintenance. He stated that the 4th Combat Team has flown over 33,000 helicopter hours, which is the equivalent of almost three years worth of peacetime flying. To support this many flying hours and ensure the division has mission-ready helicopters available whenever required, his company has had to conduct 24/7 operations for 312 straight days. Equally they accomplished three years worth of peacetime maintenance over the past 10 months -- completing 4,800 repairs, 45 major aircraft inspections, and eight helicopter recoveries.

The maintenance process is structured in tiers, starting with the preventive maintenance checks by equipment operators at the unit level and ending with major overhauls at the depot level.[49] When a fault is discovered during maintenance, inspections, or operations, repair work is initiated to classify and correct it. Unit level maintenance includes everything done either by the unit or by specialized maintenance units. The higher the echelon, the more complex the repair that can be performed.[50] Depot level maintenance is the highest level of maintenance activity, in which the most complex maintenance is done, such as overhauls of major components and complete vehicle rebuilds. With the current OPTEMPO in Iraq, the maintenance procedures described above require an intensive repair part system.

Distribution of Repair Parts in (OIF)

As mentioned, operations in Iraq have placed demands on equipment far beyond what was typically experienced prior to combat operations, which in turn placed strain on the United States Army's repair part system. To describe the supply chain that has supported OIF starting at the national level and working toward the tactical units in the field, we must begin with the procurement, repair and inventory of repair parts, which are

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[49]U.S. Office of the Secretary of Defense, 8.

managed by three organizations, the Defense Logistics Agency (DLA), Army Materiel

Command (AMC), and the General Services Agency (GSA). DLA handles common

items such as fuel, food, construction materiel, uniforms, and a wide range of

"consumable" spare parts.[51] AMC manages ammunition and weapon system or end

items specific spare parts such as engines. GSA manages common government items

such as office supplies and spare parts for automation equipment.[52] The east coast supply

distribution point, which supports U.S. Central Command (CENTCOM), is Defense

Distribution Depot Susquehanna, Pennsylvania (DDSP). It has been the primary

warehouse site for inventory used in support of OIF, and its consolidation and

containerization point (CCP) has integrated material from other DLA and GSA

distribution centers as well as direct shipment from suppliers for consolidation on pallets

and in containers. From the CCP, pallets have been trucked to Charleston, the primary

aerial ports of embarkation (APOEs) for the sustainment of OIF to be loaded on military

or commercial cargo planes.[53] Containers are trucked to either Norfolk or Newark, New

Jersey, to be loaded onto commercial container ships. Prior to and during major combat

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[50]Ibid.
[51]Marc L. Robbins and Eric Peltz, *Sustainment of Army Forces in Operation Iraqi Freedom: End to End Distribution* (Rand Corporation Santa Monica, CA: 2005), 14.
[52]Ibid., 22.
[53]Ibid.

operations, most sustainment materiel was sent from CONUS to Kuwait, primarily through Kuwait City International Airport with aerial port operations conducted by Air Mobility Command, or the seaport of Ash Shuwaykh operated by Army units under the Surface Distribution and Deployment Command (SDDC) and the 377th Theater Support Command (TSC). From the two ports, shipments are sent to the theater distribution center (TDC), under the 377th TSC, in Camp Doha to be routed to the appropriate location, which could include either transloading for delivery directly to a unit or sending the materiel to one of several theater-level warehouses in Kuwait.[54] These warehouses would then send materiel to the requesting units.

As the operating tempo increased beyond expectations in the summer of 2003, the distribution time to the theater for CONUS-based supplies continued to worsen. The growing volume of spare parts and other requests outpaced the ability of Defense Distribution Depot Susquehanna, PA (DDSP), the primary distribution center for Army shipments from CONUS to the CENTCOM area of operations, until it was no longer able to expand its capacity. A backlog developed, and times within CONUS worsened through the fall before finally recovering in February 2004 as capacity and demand

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[54]Ibid., 14.

became aligned and the backlog was finally eliminated. Capacity was increased by a series of actions at DDSP as well as other adaptations designed to relieve DDSP of some of the workload.[55]

At the same time, the theater distribution system continued to struggle up until November 2003. The mixed box problem was resolved, the theater distribution center's capacity expanded and its processes improved, and theater transportation capacity had expanded significantly. The problem of mixed pallets remained though, which continued to hamstring operations. Starting in November 2003, a plan to build pallets for the region for each Supply Support Activity and its supported units was worked out between Combined Forces Land Component Command and Defense Logistics Agency. In March 2004, this practice was extended to Air Mobility Command, which also builds pallets with cargo for Army units for certain types of materiel, including oversized or hazardous.[56]

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[55]Ibid.

[56]Ibid.

Ordering Repair Parts during Combat Operations

The slow distribution times combined with high demand rates limited the value of tactical stockage in Iraq in Authorized Stockage Lines (ASLs). ASLs and the model used to determine them assume that when parts are consumed from the ASL, the supply support activity (SSA) would immediately order replenishment when the appropriate level or the reorder point (ROP) is reached or will immediately order each nonstocked item from the supply chain when needed to complete a repair.[57] For a variety of reasons, these assumptions did not hold during OIF's major combat operations. Very few parts were ordered during this period. This is a concern because any delays before ordering extend the replenishment time beyond the typical requisition wait time, which was often used to plan ASL depth.[58] Nevertheless, it is important to understand the reasons why units were unable to receive parts during combat operations.

The lack of ordering and receiving parts stem from five issues: creating a request and submitting a requisition; requisition wait time; receipt processing; asset visibility; and the referral process.

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[57]Ibid., 30.
[58]Ibid.

Submitting Requisitions

The first step in ordering a part is for a maintainer to diagnose the problem, write it down, and give it to the supply clerk. The supply clerk identifies the parts that are needed to repair the equipment and submits a requisition through a Unit Level Logistics System-Ground (ULLS-G) to the SSA. In most cases the SSAs are located on a different forward operating base from the requesting units, and without satellite communications, units could not submit an electronic requisition from their location to the SSA. In addition, the SSA could not submit their requisitions to the depots located in the United States without a dedicated satellite communication system.

Receipt Processing

Receipt Processing in Iraq did not work in accordance with Army Regulation 735-50. Army Regulation 735-50 states that receipts will be processed through the storing activity, regardless of geographical location, with minimal delay. Receipts will be recorded on both the storage locator record and the accountable activity records.[59] Receipt processing will be measured in two segments. Segment one is the date of tailgate off-loading to date of posting to the on-hand balance of the stock record file. Segment

two is the date of tailgate off-loading to date when storage location or proof of storage is posted in the storing activity record. Receipts from new procurement and redistribution will be processed through segment one or segment two (whichever is longer in time).[60] It will be within seven–consecutive calendar days. All other receipts will be processed through segment one or two (whichever is longer in time) within 10 calendar days. The time in which it take to process parts are critical because the longer a repair part stays at the Supply Support Activity (SSA) without being processed, the more likely the repair part and/or the paperwork will be lost or stolen.

25. During Operation Iraqi Freedom I and II, receipt processing became out of control because of a major decision that was made to cancel the Requisition Order Number, Document Order Number (RON/DON) management process. RON/DON allows the logistician at the lowest level to maintain visibility of a requisition from factory to foxhole. For example, if a unit submits a requisition for a tire, and the tire is located at New Cumberland Army Depot, the higher level SSA's document number is automatically placed on the requisition as it passes through the repair part supply system. This process allows for management of requisition wait time, referral process, receipt processing time and distribution of requisitions at each level. Additionally, this process provides the capability to cancel and/or redistribute requisitions when units redeploy or no longer require the part.[61] At the start of Operation Iraqi Freedom, a decision was made to cancel the RON/DON process, which meant that units could pass requisitions as dedicated documents directly to the depots. This created two major challenges for managing requisitions. The first challenge was elimination of the management of requisition wait

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[59]U.S. Army Regulation 725-50, *Requisition, Receipt, Issue System* (Washington D.C.: GPO, November 1995), 71.
[60]Ibid.
[61]Author's personal knowledge and experience of the RON/DON Process.

time, referral process, and receipt processing time, which is critical when managing readiness.[62] Secondly, by allowing the units to pass requisitions as dedicated documents straight to the depot, no one else in the supply chain could cancel the requisition or redistribute repair parts when the parts were no longer needed which created tons of excess parts that had to be processed, which increased the receipt processing time tremendously.

Requisition Wait Time

Projecting and sustaining forces hinges on successfully establishing and managing air, ground, and sea lines of communication. These lines of communication represent the pipelines through which all classes of supply flow and often are referred to as supply chains because of the numerous links between the various nodes. Timely flow of supplies through these chains is critical to providing support to the Warfighter.[63] In fact, speed of delivery is becoming a key indicator of logistics success. The dynamic nature of current and future operations requires constant analysis of hour by hour status of supplies transiting these pipelines. Measuring the performance of the supply chain is critical to identifying troubled segments, determining success, and assessing operational

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[62]Ibid.

[63]David R. Gibson, "Average Customer Wait Time: A Supply Chain Performance Indicator," *Army Logistician,* November–December 2004.

capabilities. Measuring performance requires a metric that measures the time from demand creation to demand fulfillment at the customer level.[64]

The Logistics Support Activity, of the United States Army Materiel Command, started tracking requisition wait time (RWT) for CL IX repair parts in Iraq around September 2006 and continues to this date. In accordance with LOSAs tracking system, the average RWT for the Warfighter is twenty days, which means a vehicle that becomes non- mission capable (NMC) for a repair part (not located in theater) will remain NMC for at least twenty days.[65] Tracking this performance has been critical in identifying distribution challenges and supply chain bottlenecks because every delay diminishes readiness.

Total Asset Visibility

Asset Visibility in Iraq needs improvement. The current asset visibility structure focuses on tagging individual pieces of cargo and telling the user the last known location of a piece of cargo. However, the system does not tell the user where that cargo is currently, who has it, where it is going, or who signs for it once it is received.[66] An

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[64]Ibid.
[65]Ibid.
[66]COL Mark W. Akins, "1st COSCOM Total Asset Visibility in Iraq," *Army Logistician,* March-April 2006.

effective asset visibility and its component in-transit visibility system must be able to answer all of those questions.

Asset Visibility Process in OIF

Currently, repair parts coming from depots in the United States are tagged with a military shipping label at the depot and aggregated for shipment by routing identifier code (RIC). A RIC designates the location of the SSA that will service the repair part when it arrives. When the repair parts are placed on RIC pallets, they receive a radio frequency identification (RFID) tag that identifies all items down to the national stock number level.[67] When repair parts are shipped, they are tracked by a transportation control number (TCN) and RFID tag. If the repair parts move by air, the Air Force's Global Air Transportation Execution System (GATES) tells the user what TCN and RFID tags are on every aircraft when the aircraft lands in Kuwait or Iraq, a fixed-site RFID interrogator reads the tag on the cargo.[68] If the cargo goes to the theater distribution center (TDC) in Kuwait, it is aggregated with other loads destined for the same RIC and put on a truck for onward movement to the unit. Once the cargo arrives at

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[67]Ibid.
[68]Ibid.

the unit's supporting SSA, it is read by the SSA's fixed-site interrogator and repalletized into unit logistics packages and pushed or picked up by the unit at the SSA.[69]

Asset Visibility Shortfall

The current asset visibility process sounds simple, but it can result in loss of visibility of cargo enroute to the Warfighter. There are several reasons for this loss. One of the reasons is the lack of standards for tagging and labeling the cargo. The United States depots generally do a good job of labeling and tagging all shipments; however, SSAs at the tactical level do not. Training tactical SSAs and enforcing standards plays a large role in maintaining asset visibility.[70]

Referral Process

The referral process is the order used between supply sources and distribution systems to pass requisitions for supply when the initial activity cannot fill the demand.[71] When the United States Army developed the Standard Army Retail Supply System Objective (SARSS-O), it was designed to allow the Army to refer throughout a theater of operations. Referral simply means that if one division or corps does not have a repair

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[69]Ibid.
[70]Ibid.

part then it will refer to the others before going out of theater to the depots. The

management of the referral process is a division/corps/theater responsibility and when it

is mismanaged, it is impossible to maintain visibility of supplies within an area of

operations.

Throughout OIF, the referral process has never worked. Units are ordering tons of

supplies directly from the United States that exist in warehouses in theater. If the

supplies were provided in theater, the requisition wait time would be reduced by at least

ten days. A clear example of the frustration that senior military leaders are experiencing

with the referral process was mentioned by the commander of Transportation Command

in December 2006. He stated that units were ordering HUMMWV engines from the

United States Army's depot while, the exact same engines were located at the

Distribution Center in Kuwait.[72] The referral process does not work because units are

able to turn their referral switch off in the SARSS system.

The question becomes: How did equipment perform given these severe Class IX

problems? The short answer is that, during combat operations, units were able to

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[71]U.S. Army Regulation 725-50, 550.
[72]Statement made by the TRANSCOM commander during a visit to TRANSCOM

maintain equipment well enough to keep combat power high.[73] The equipment readiness

standard was "shoot-move-communicate": could the weapon system shoot, could it

move, and could it communicate? The only parts that absolutely had to be replaced

during combat operations were those that contributed to this standard.

[73]Robbins and Peltz.

CHAPTER FOUR

Doctrinal Modification: Desert Shield/Storm and OIF

This chapter discusses the doctrinal modifications made to improve the
distribution and management of repair parts as a result Desert Shield and Desert Storm
and its impacts during Operation Iraqi Freedom. The United States Army made
modifications to its doctrine to improve the distribution and management of repair parts
after the lessons learned from Desert Shield and Desert Storm in three specific areas: the
change from a supply-based distribution system to distribution-based supply system;
asset visibility; and a new Standard Army Management Information Systems for Supplies
(SARSS).

Supply-Based Distribution System to Distribution-Based Supply System

26. The Army transitioned from a supply-based Combat Service Support (CSS)
distribution system to a distribution-based CSS system after Desert Shield and Desert
Storm. "Supply based" CSS is a system that relies on large, decentralized stockpiles of
supplies owned by organizations or individual units. "Distribution-based" CSS is a
system in which smaller, more centralized stockpiles can be used to supply numerous,
geographically dispersed organizations by leveraging modern transportation means
combined with automated information system.[74] The commander of the Defense
Logistics Agency (1999) described the transitioned from supply-based to distribution
based as such: "Logistics has changed from a supply-based system relying on large

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[74]U.S. Army Field Manual 100-10-1, Theater Distribution, 1999, 3-4.

stockpiles to a quick developing web-enabled distribution system that exploits advances in commercial information systems to gain total asset visibility and to improve management of the entire supply chain."[75] To fully understand the complexity of the Army's distribution system and the repair part challenges, it is important to first understand the Army's principals in distribution.

Principal of Distribution

27. The operational art of distribution is the centerpiece of the end-to-end continuum of a distribution-based CSS system. Distribution is described in JP 4-0 as a function of visibility, management and transportation. A distribution-based CSS system includes not only the visibility, management, and transportation of resources flowing through the CSS pipeline, but also of the networks that comprise the distribution system. Thus, the operational art of distribution is also a function of the critical capabilities of visibility, capacity, and control. These critical capabilities are reflected in five interrelated principles that guide the dispensing of resources through a distribution-based CSS system.[76][77]

28. *Centralize Management* – Centralizing management is essential to efficient and effective distribution system operations. It involves the integrated end-to-end visibility and control of the distribution system capacity and distribution pipeline flow. Designated distribution managers in distribution management centers (DMCs) of the support operations element to each support echelon manage distribution operations and coordinate and synchronize movement of supplies, personnel, and unit equipment.

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[75]Lieutenant General Henry T. Glisson, "Revolution in Military Logistic – Improving Support to the Warfighter," *Army Logistician*, January-February 1999, 8.

[76]U.S. Army Field Manual 100-10-1, Theater Distribution, 1999, 2.

[77]Colonel C. Brandon Cholek and Chief Warrant Office (W-5) Matthew A. Anderson, Sr., "Distribution-Based Logistics in Operation Iraqi Freedom," *Army Logistician,* April 2007.

Colonel C. Brandon Cholek and Chief Warrant Officer (W-5) Matthew A. Anderson Sr. defined distribution is outbound logistics, from the end of the production line to the end user. It includes activities associated with the movement of materiel, usually finished goods or service parts fro the manufacturer to customer. These activities encompass the functions of transportation, warehousing, inventory control, materiel handling, order administration, site and location analysis, industrial packaging, data processing, and the communication network necessary for effective management.

Materiel management and movement control operations at each echelon are synchronized under the plans and policy office and DMC of the support operations element.[78]

29. *Optimize Infrastructure* – Optimizing infrastructure is essential to maintaining balance with the total distribution system. System infrastructure dictates the finite capacity of the distribution system. This principle involves the ability of distribution managers at each echelon to maintain visibility of the infrastructure under their control, and to reallocate or acquire physical and resource network capabilities to meet changing requirements.[79]

30. *Maximize Throughput* – Whenever possible, national strategic-level CSS elements use throughput to prepare resources for direct, time definite delivery to a supply support activity (SSA) or assemble area (AA) in an Area of Operation (AO). Throughput distribution bypasses one or more echelons in the supply system to minimize handling and speed delivery forward. A distribution-based CSS system emphasizes the use of containerization, to include palletization and packaging, to accommodate the (AO) and improve velocity. Velocity is achieved through the throughput of resources from the sustaining based to tactical-level support organizations.[80]

31. *Minimize Forward Stockpiling* – The velocity of a distribution system reduces the reliance on large stockpiles of resources within an AO. Under this principle, forward stockpiling complements the time definite delivery of resources through the distribution system. It involves the ability to provide the minimum essential stockpiles of supplies and minimum services required to begin operations in a theater, and to augment the continuous and seamless flow of resources within the CSS pipeline.[81]

32. *Maintain Continuous and Seamless Pipeline Flow* – The principle of continuous and seamless pipeline flow involves the application of all other distribution principles to produce the end-to-end continuum of a distribution system. The integrated CSS/C2 automation and communication networks of the distribution system provide the strategic,

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[78]U.S. Army Field Manual 100-10-1, 3-3.
[79]Ibid., 3-4.
[80]Ibid.
[81]Ibid.

operational, and tactical connectivity that allows the distribution management structures the capability to maintain continuous and seamless pipeline flow.[82]

Distribution Based Logistics

Operation Iraqi Freedom marked what has become known as distribution based logistics (DBL). DBL means limited inventory to cover small disruptions in distribution flow and enough supply to cover consumption between replenishments. The primary reliance is placed on frequent, reliable distribution rather than on large forward stockpiles. This is roughly how OIF combat operations were conducted.[83] Except for small buffer stocks, logistics support supplies stayed at an intermediate support base (ISB) (e.g. Kuwait) and were not pushed forward in large amounts. Further, the supply levels at the ISB remained limited in comparison to some past campaigns. For example, when ground operations began in Operation Desert Storm, forward logistics bases near the Iraqi border had 29 days of supplies and 45 days of ammunition stockpiled to support operations, in addition to what was farther back at theater bases.[84] By contrast, in OIF, supplies at the port and at the general warehouses were down to less than a day of supply

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[82]Ibid.
[83]Robbins and Peltz, Xi.
[84]Army Materiel Command (AMC), *Theater Logistics in the Gulf War*, 1994. The goal was actually 60 days of fuel, food, and ammunition.

early in combat operations, with as little as five days of supply contained in on hand stocks within units.[85]

Although inventory was reduced, many of the enablers of DBL were not in place, such as good in-transit visibility of supplies. Nor were many of the supporting processes, such as load building in the continental United States (CONUS), aligned with DBL concepts.[86] In short, many of the critical elements of a DBL system were not in place or suffered problems, being overcome only by exceptional efforts by outstanding soldiers. The experience points to numerous issues, but several observations should be highlighted. Operating under the DBL paradigm may not always be comfortable for commanders and the troops, especially if this is not what they are used to, whether from training or from previous deployed operations. This is particularly true without complete, accurate, and real-time information about current and projected supply levels, which raises the perceived level of risk when relying on distribution rather than large stockpiles.[87]

Finally, the desired levels of acceptable risk and associated buffers need to be carefully examined. The sandstorm that occurred a few days into ground combat

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[85]Robbins and Peltz, Xi.
[86]Ibid.

provided an example of how a two- to three-day disruption can affect a force that is
operating with limited supplies.[88]

Total Asset Visibility

Understanding that distribution is a function of visibility, it is important to expand
upon the improvements that United States Army made in asset visibility at the Strategic
and Operational levels.

The United States Army made great strides in improving asset visibility at the
strategic and operational levels. The Army learned from Operations Desert Shield and
Desert Storm that it was unable to track supplies and equipment from the strategic
industrial base to the theater of operations.[89][90] This failure caused the theater logistics

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[87]Ibid.
[88]Ibid.
[89]Kelvin D. Kingsley, "Asset Visibility in the Tactical Environment," *Army Logistician,* PB 700-6-01,
Volume 38, Issue I, January-February 2006.
[90]Mae De Vincentis, "The Need for Asset Visibility," Operational Logistics Information Technology
Conference, 2005.
Ms. Mae De Vincentis, Director, Information Operations, Defense Logistics Agency wrote an article for
the Operational Logistics Information Technology Conference 2005 title The Need for Asset Visibility in
which she stated that Based on Logistics deficiencies identified during Operations Desert Storm in
1990/91; Mounds of materiel; inability to find items or modify distribution in support of military operations
led to over-ordering of assets. She stated that despite improvements, a need for further enhancements was
identified during Operation Iraqi Freedom. Material and personnel still arrive in theater without adequate
advance information, or an ability to track through the last tactical mile.

footprint to grow exponentially and placed a heavy burden on supply and transportation systems.

The Army recognized this deficiency and implemented steps to develop a DOD-wide Automatic Identification Technology (AIT) vision to integrate existing and new technologies to support future operations. This vision emphasized the development of a suite of interoperable AIT media and infrastructure to support asset visibility within the Army's logistics operations.[91] Even though the Army was able to implement AIT at the strategic and operational levels, it was not as successful in devising and implementing a plan for operations outside of the normal peacetime environment. This was evident during the initial stages of Operation Iraqi Freedom, when tracking supplies pushed from the strategic and operational levels was nearly impossible.[92] Asset visibility should not stop at the strategic level but go as far forward as possible to support the tactical environment.

Legacy System Shortfalls

Total asset visibility is achieved by using timely and accurate information systems that track the distribution of assets. Visibility begins at the point from which materiel is

[91]Kingsley.

shipped to the theater of operations and continues until it reaches the user. Critical to

visibility is the capability to update source data dynamically with the near-real-time status

of shipments from other combat service support (CSS) systems until the shipments arrive

at their ultimate destinations.[93] However, this is a difficult task because the legacy

logistics automation systems used in CSS activities is not interoperable with current and

emerging AIT. Moreover, the Army's logistics distribution processes are not using the

type of technologies used by large distribution-based commercial enterprises.[94]

To combat this short-fall and integrate interoperability into its systems, the Army

has begun to form partnerships with commercial industries such as Wal-Mart in hopes of

learning how they apply asset visibility technologies.

During Operations Desert Shield and Desert Storm, the Army's problems with tracking

and maintaining visibility of deployed units' CSS resources were caused largely by a lack

of technology and the use of legacy logistics systems that provided only a limited

capability to communicate throughout the supply chain. As a result, commanders at the

tactical level developed a "just-in-case" logistics strategy.[95] Since the CSS systems were

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[92]Ibid.
[93]Ibid.
[94]Ibid.
[95]Ibid.

not responsive and failed to provide near-real-time visibility of needed supplies and

equipment, tactical commanders often placed several orders for the same item "just in

case" the first order did not arrive.[96] This practice placed a heavy burden on the

industrial base, the war reserve stockpile, and the transportation system from the strategic

to the tactical levels. During Operation Desert Storm, more that half of the contents of

400,000 cargo containers shipped to the desert—including $2.7 billion worth of spare

parts—was not used, according to a Government Accountability Office report.[97]

Asset Visibility during OIF

33. GAO's report to Congressman Jerry Lewis, chairman of the House Appropriations Committee, stated that, "although major combat operations during the initial phases of OIF were successful, there were substantial logistics problems."[98] GAO reported that one of the problems was the duplication of requisitions and circumvention of the supply system as a result of inadequate asset visibility. [99] Units operating in Iraq could not track equipment and supplies adequately because asset visibility systems were not fully interoperable.

34. The same logistics issues that prevailed in Operation Desert Storm caused commanders to resort to the "just-in-case" ordering strategy in OIF, even though DOD had directed all activities to implement its AIT plan.[100] At the theater distribution center in Kuwait, hundreds of pallets, containers, and boxes of supplies and equipment piled up.

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[96]Ibid.
[97]Ibid.
[97]Ibid.
[98]Ibid.
[99]Ibid.
[100]Ibid.

Radio frequency identification (RFID) tags were not used consistently in spite of an order issued in January 2003 by General Paul J. Kern, Commander of the Army Materiel Command, requiring that all air pallets, containers, and commercial sustainment shipments supporting Operation Iraqi Freedom be identified with RFID tags. Months earlier, General Tommy Franks, Commander of the U.S. Central Command, had issued a policy requiring the use of RFID tags whenever feasible to track assets shipped to the theater. [101] [102]

35. The tactical environment of OIF presented many challenges that doctrine or policy did not or could not consider. Without knowing where the required CSS resources were, or if they were available, materiel managers could not conduct their mission effectively or efficiently. [103] However, because soldiers are professionals, they accomplished their mission by relying on their creative abilities and skill to solve problems.

Standard Army Retail Supply System (SARSS)

36. After Desert Shield and Desert Storm, the Army implemented a new system Standard Army Retail Supply System-Objective (SARSS-O) to improve the management and requisitioning of supplies throughout the Army during garrison and combat operations. This system has proven to be a very reliable system for those few who

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[101]Ibid.

[102]David L. Brewer III, Vice Admiral, U.S. Navy Commander, Military Sealift Command, "Commander's Perspective, Military Sealift Command, 2004," *Military Review.*

Vice Admiral David L. Brewer III, provided his perspective on the challenges the United States Army is with RFID Tags during Operation Iraq Freedom. He stated that TRANSCOM has been working with DOD and its component commands – AMC, MSC, and SDDC – for more than two years to bring new technology to bear on the visibility issue. One of the outcomes is the use of radio frequency identification, or RFID, tags to make cargo selection, loading and tracking more accurate and much faster at those locations where the transportation mode changes. Resolving problems at those nodes eliminates the primary cause of cargo bottlenecks. Field commanders can be more confident that the equipment and supplies they need for their war fighters will arrive on time. He stated that radio frequency identification tags are now being used instead of bar code readers to identify each specific piece of equipment and each container. Bar code, an older, 20th century technology, was quite an advance in its time, but it is a cumbersome process that requires individuals to approach and point a bar code reader at every vehicle or container being loaded. He stated that RFID tags will work if units are discipline when using the technology.

[103]Kingsley.

understand it. The SARSS-O system is a Standard Army Management Information System (STAMIS) for Army retail supply operations and management for the Total Army. SARSS-O is comprised of four integrated systems: SARSS-1 at the Supply Support Activity (SSA) level, SARSS-2AD at the division, separate brigade, or Armored Cavalry Regiment (ACR), and the Materiel Management Center (MMC) level, SARSS-2AC/B at the corps and theater MMC levels, and SARSS-Gateway, formerly known as the Objective Supply Capability (OSC) at the strategic level.

The first and most critical to understand of the four integrated systems is SARSS-1. SARSS-1 maintains accountable records and performs supply operations (i.e., receipt, storage, and issue of supplies). It extends automation and accountability to the lowest support echelon of supply, the storage activity. This provides automation to storage personnel who directly serve customer units and provide a system that is highly responsive to the Warfighter's needs. Major functions executed in SARSS-1 include processing customer requests for issue, cancellations, or modification, receipts, replenishment, excess, inventory, and location survey.[104] The SARSS-1 site is the most critical of all of the nodes which will be discussed within this chapter, because this is the level in which the Warfighter will either receive a requested repair part or establish a requisition within the wholesale system, which has been one of the greatest challenges in Iraq today. It has been my experience as a logistician that the units that are able to establish their requisition at the SARSS-1 site while deployed in Iraq have the best

equipment readiness rate within the theater of operations because they are receiving the repair parts needed to sustain the equipment. The challenge is establishing the connectively between the Unit Level Logistics System – Ground (ULLS-Ground) and the SARSS-1 site. Just as important when establishing requisitions within the wholesale system is knowing the status of the request. This is done through extensive management of open document registers.[105]

The second of the integrated systems is the SARSS-2AD. The SARSS-2AD provides intermediate management of the supply system at the division level. It provides reparable management and tracks excesses. It also provides referrals by conducting lateral searches among SARSS-1 locations within the division. It interfaces with the SARSS-2A(C/B) located at the COSCOM support operations office, which tracks demand and document history, financial record keeping, and conducts lateral searchers at the corps and theater levels.[106] Conducting the lateral searches at the corps and theater levels is the most critical of all the functions that the SARSS-2A does because it reduces the requisition wait time and receipt processing by half.

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[104]Marc L. Robbins and Eric Peltz, *Combat Service Support Automation Officer*, Fort Carson CO, http://www.carson.army.mil/DOL/CSSAMMO/SARSS.htm.
[105]Author's personal knowledge of the system.
[106]U.S. Army Field Manual 4-93.52 Tactics, Technique and Procedurals for the Division Support Command (Digitized), May 2002, 2-17.

37. The third of the integrated systems is the SARSS-2AC/B. The SARSS-2AC/B performs non-time sensitive supply management functions for catalog update, document history, demand analysis, and financial interface. The SARSS-2AC/B is employed at the COSCOM or Theater Level.[107] The SARSS-2A(C/B) has the least of all impact on a unit's ability to manage repair parts. It is strictly used as a historical and demand analysis system.

38. The final integrated system is the SARSS-GATEWAY. The SARRSS-Gateway is designed to make optimum use of automation and communication techniques by integrating the wholesale and retail supply system into a single seamless supply system. The SARSS-Gateway provides for the same day processing of request for issue, visibility of all assets within an area, status of users and later distribution of assets.[108] The ultimately goal of the logistician is to be able to pass a requisition through the system to the Gateway which means that the requisition is established at the National Inventory Control Point and has Army level visibility.

SARSS-O has proven to be a tremendous improvement from the automation capability during Desert Shield and Desert Storm, however there must be management procedures put into place to prevent the RON/DON situation from happening within the system.

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[107]Ibid., 2-18.
[108]Ibid.

CHAPTER FIVE

Conclusion and Recommendations

The biggest questions in which this monograph is intended to answer concerning equipment readiness in Iraq is whether or not the United States Army can improve readiness without doctrinal modification to the distribution and management of repair parts. As mentioned throughout the monograph, there were three major repair part distribution and management system failures that were overcome only by exceptional efforts by outstanding soldiers.

The first of which was the paradigm shift from a supply based CSS distribution system (large forward stockpiles) to the distribution based CSS system (frequent reliable distribution) in which critical elements of the system were not in place prior to the start of operations in Iraq. The distribution based CSS system is designed to be frequent and reliable in which it was not at the start of Operation Iraqi Freedom. This created discomfort for commander and logisticians especially experiencing it for the first time during combat operations, in which resulted in confusion causing units to reorder the same repair parts over and over again. Eventually, the repair parts were shipped and received, however it created a tremendous strain on the United States Army's logistics system to process multiple and triple requisition for the same items by the same units. This was only the tip of the iceberg; it also created tons of excess repair parts at the Theater Distribution Center in Kuwait, and SSAs that had to be processed before they got to the warfighers. The longer it takes to requisition, receive, process, track and issue repair parts, the longer it take to improve equipment readiness.

Secondly, the decision to cancel the RON/DON process eliminated the any possibility of effectively managing basic supply operations. It eliminated the management of requisition wait time, referral process, and receipt processing and asset visibility. The cancellation of the RON/DON process increased the requisition wait time because it created duplicate requisitions in which overloaded the capability of the system; receipt processing time increased tremendously because of the volume of excess; asset visibility was lost while in-transit from depot to user; and the referral process was impossible without visibility.

Thirdly, Total Asset Visibility was a major issue. As mentioned in the monograph a GAO report to Congressman Jerry Lewis, chairmen of the House Appropriations Committee, stated that "although major combat operations during the initial phases of OIF were successful, there were substantial logistics problem.[109] The report stated that one of the problems was the duplication of requisitions and circumvention of the supply system as a result of inadequate asset visibility.[110] One of the reasons for inadequate asset visibility was the lack of standards for tagging and labeling the cargo. In accordance with an article written by COL Mark W. Akins, in

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[109]Kingsley.
[110]Ibid.

which he stated that the United States depots generally do a go job labeling and tagging all shipments; however, SSAs at the tactical level do not. He stated that training tactical SSAs and enforcing standards play a large role in maintaining asset visibility.[111]

The United States Army made doctrinal improvements in repair part distribution and asset visibility, after Desert Shield and Desert Storm however encounter some of the same challenges doing Operation Iraqi Freedom. The United States Army ordered tons of excess repair parts doing Desert Shield and Desert Storm using the supply based CSS system and did the same with the new distribution based CSS system concept. One would think that this would have been the case. As a result of Desert Shield and Desert Storm, DOD also developed Automatic Identification Technology to fix the asset visibility concerns, however the US Army experienced a lack of asset visibility during Operations Iraqi Freedom.

Clearly, the operational tempo, harsh environment, and equipment density in Iraq is placing a much higher demand on the United States Army's equipment which requires a repair parts system that can maintain pace. Understanding that the longer it takes to requisition, receive process, track and issues repair parts to the warfighter, the longer

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[111]Akins.

equipment stays non mission capable, therefore, there must be doctrinal changes to improve repair part performance and equipment readiness.

Recommendations

The United States Army can improve the distribution and management of repair parts during combat operations which will improve equipment readiness by implementing the following modifications to repair part doctrine; fielding of a Very Small Aperture Terminals at the tactical level for logistics communication; eliminate two steps in the automated requisition process by allowing tactical SSAs to communicate at the Strategic level; process requisition at the depot level Requisition Identification Code (RIC) pure; distribute pallets from depot to SSAs RIC pure.

Fielding Very Small Aperture Terminals (VSAT)

Recommend that the United States Army field the VSAT at the tactical level to improve supply and maintenance performance. The VSAT is a portable satellite system capable of transmitting data, batch files, voice and limited video transmissions. The system can be configured for over 100 Internet Protocol (IP) addresses to serve an entire brigade's Standard Army Management Information System (STAMIS).

The VSAT-based communication network can be set in hours instead of days, ensuring a unit's successful transmission of maintenance and supply data immediately. The communication speed is comparable with the traditional local area network (LAN) infrastructure, and has the advantage of satellite versus line of sight communications.

Encryption and other security measures commonly used with LAN communication are already in use with the VSAT.

Reliable, dedicated communications configured for the STAMIS systems allow for continuous blocked asynchronous transmission (BLAST) of data, eliminating the need to drop disks. This tremendous capability will provide the warfighter and logistician the capability to access real time data on the status of requisitions throughout the logistics system, which will

prevent units from reordering the same parts multiple times (creating excess) because of uncertainty in the statuses. Eliminate two Steps in the Requisition Process in SARSS-O

The author recommends that the United States eliminate two steps in SARSS-O process in which a requisition passes through prior to being established at the wholesale level. The elimination of these two steps will improve requisition wait time tremendously. SARSS-O is comprised of four integrated systems: SARSS -1 at the tactical Supply Support Activity level, SARSS-2AD at the division level, SARSS 2AC(C/B) at Corps/Theater level, and SARSS-Gateway at the Strategic level. SARSS 1 is the most critical of the four integrated systems because this is the level in which the warfighter receives a requested repair part or establish a requisition in the wholesale system.

SARSS 2AD is a management systems used to track demand and document history, financial record keeping, and conduct lateral searchers at the corps and theater levels.

SARSS 2AC(C/B) has the least of all impact on a unit's ability to manage repair parts. It is strictly used as a historical and demand analysis system.

The fourth integrated system is the SARSS-Gateway. The SARSS-Gateway is designed to make optimum use of automation and communication techniques by integrating the wholesale and retail supply system into a single seamless supply system.

The author recommends eliminating the SARSS 2AD and SARSS 2AC systems in the process and allowing the SARSS-1 to communicate directly with the SARSS-Gateway at the strategic level, which will allow logistician to establish a requisition at the wholesale level much faster and reduce the requisition wait time tremendously. The only modification that must be done within the SARSS-O process to make this recommendation work will be to enhance the SARSS-1 software packages to be able to refer throughout the theater of operations.

Depot Requisition Identification Code (Processing)

Recommend that the United States Army establish procedures and doctrine that will allow requisition to be received and processed at the strategic level by brigade combat team (BCT) rather than by individual units. This process is called requisition identification code pure processing. This will allow the Army's Depot's to receive, process and package repair parts in multi-packs or pallets and distribute directly to the SSA that provides combat service support to that particular BCT. These procedures will improve logistics performance in several ways; first it will eliminate the requirement to process receipts at the Theater Distribution Center in which normally takes weeks if not longer based on the volume of repair parts. Secondly, it will improve in-transit visibility

tremendously because once the multi-pack or pallet is tagged at the Depot, and shipped

by BCT; there is no other requirement to retag the shipment while in-transit. The

shipment will remain intact until the supporting SSA receive process and issues the repair

parts to the Warfighters. Most importantly, these procedures will reduce requisition wait

time for the warfighter, and improve receipt processing time at the tactical level.

SSA Pure Distribution

The author recommends that the United States Army implement doctrine and

procedural that will allow for the shipment of repair parts SSA-Pure. SSA pure is defined

as shipping repair parts from the Depots to the theater by SSA rather than by individual

units. In accordance with a study conducted by the Rand Arroyo Center in which it

stated that there were a marked difference between the requisition wait time and receipt

processing rates for materiel shipped in SSA-pure multi-packs and materiel shipped in

mixed multi-packs or pallets. The study stated that when pallets went from mixed to

pure; the theater saw substantial improvement in theater distribution performance.[112]

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[112]Eric Peltz and others, eds., *Sustainment of Army Forces in Operation Iraqi Freedom*, (Rand Corporation), 2005, 70.

This is a clear example as to why the United States should implement joint doctrine that

allows shipment by SSA-Pure rather than the exception.[113]

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